

CLAIMS

1. A tire vulcanizing method wherein a green tire is loaded into a segmented tread mold having been opened radially outward; wherein a vulcanization processing is performed with the segmented tread mold closed radially inward and with a bladder expanded inside the green tire having been loaded; and wherein upon completion of the vulcanization processing, the vulcanized tire is removed by opening the segmented tread mold radially outward; the method being characterized by enabling the bladder to expand and contract at a vulcanization position within the segmented tread mold as well as to expand and contract also at a tire delivery position which is outside the segmented tread mold to be a predetermined distance away from the vulcanization position along the axis of the segmented tread mold and the method being characterized by comprising the steps of expanding the bladder at the delivery position to make the bladder hold the green tire loaded into the tire delivery position; making the bladder load the green tire into the segmented tread mold at the vulcanization position; after the vulcanization processing, making the bladder remove the vulcanized tire from the vulcanization position to the delivery position; and contracting the bladder at the delivery position for releasing the vulcanized tire from the bladder.

2. A tire vulcanizing method in a vertical vulcanizer wherein relative to a lower mold containing a green tire, an upper mold arranged over the lower mold in axial alignment with the same is lowered to combine the upper mold with the lower mold; and wherein a pair of bladder operating sleeves movable vertically are provided for air-tightly binding upper and lower end ring portions of a bladder which is expanded inside the green tire; the method being characterized by the step of making a single centering shaft pass

through centers of the lower mold, the upper mold, the green tire, the bladder and the pair of bladder operating sleeves during a vulcanization so that the vulcanization processing is performed with the single centering shaft centering the pair of bladder operating sleeves relative to the lower mold and the upper mold.

3. The tire vulcanizing method as set forth in Claim 2, characterized in that the bladder is made to be expandable and contractible at a vulcanization position inside a segmented tread mold which constitutes the lower mold to be opened and closed radially in a horizontal plane and is made to be expandable and contractible also at a tire delivery position which is outside the segmented tread mold to be a predetermined distance upwardly away from the vulcanization position along the axis of the segmented tread mold; the method being characterized by the steps of expanding the bladder at the delivery position to make the bladder hold the green tire loaded into the tire delivery position; making the bladder load the green tire into the segmented tread mold at the vulcanization position; after the vulcanization processing, making the bladder remove the vulcanized tire from the vulcanization position to the delivery position; and contracting the bladder at the delivery position for releasing the vulcanized tire from the bladder.

4. A tire vulcanizer characterized by comprising a vertically extending frame; a lower mold fixedly arranged at a lower position than an approximately mid position of the frame in a vertical direction; an upper mold arranged at a higher position than the mid position of the frame and guided on the frame to be vertically movable in axial alignment with the lower mold and to be positioned by a feed mechanism in the vertical direction; a bladder arranged coaxially with a mold center axis passing through centers of the

lower mold and the upper mold; first and second bladder operating sleeves arranged approximately coaxially with the mold center axis to be vertically movable as well as to be horizontally displaceable minutely and respectively air-tightly binding a lower end ring portion and an upper end ring portion of the bladder; bladder positioning mechanisms for independently vertically positioning the first and second bladder operating sleeves; and a centering shaft arranged on the mold center axis to be vertically movable by another feed mechanism and enabled to pass through the upper mold, the bladder, the first and second bladder operating sleeves and the lower mold during a vulcanization for centering the first and second bladder operating sleeves relative to the upper mold and the lower mold.

5. The vulcanizer as set forth in Claim 4, characterized in that the bladder positioning mechanisms are able to position the first and second bladder operating sleeves so that the bladder is expanded at the vulcanization position inside the lower mold, and that the bladder positioning mechanisms are also able to position the first and second bladder operating sleeves so that the bladder is expanded at the approximately mid position of the frame in the vertical direction, the mid position being spaced upward from the vulcanization position.

6. The vulcanizer as set forth in Claim 5, characterized by further comprising a pair of upper and lower bladder expansion control members for being brought into contact respectively with upper and lower side surfaces of the bladder to control the expansion operation and the side surface shape in the expansion state of the bladder; and control member positioning feed mechanisms for independently positioning the pair of the bladder expansion control members in the vertical direction.

7. The vulcanizer as set forth in Claim 4, characterized in that the bladder positioning mechanisms comprise a first bladder operating sleeve feed mechanism arranged at a higher position than the approximately mid position of the frame for vertically feeding the first bladder operating sleeve; and a second bladder operating sleeve feed mechanism arranged at a lower position than the approximately mid position of the frame for vertically feeding the second bladder operating sleeve.

8. The vulcanizer as set forth in Claim 7, characterized in that the first bladder operating sleeve and the first bladder operating sleeve feed mechanism are connectable to and separable from each other and that connection means is further provided for connecting the first bladder operating sleeve to the first bladder operating sleeve feed mechanism.

9. The vulcanizer as set forth in Claim 7 or 8, characterized in that the first and second bladder operating sleeve feed mechanisms are respectively composed of servomotors which are controllable synchronously.

10. The vulcanizer as set forth in any one of Claims 4 to 9, characterized in that there is provided a movable frame arranged at a higher position than the approximately mid position of the frame and guided to be vertically movable on the frame; that the upper mold is fixedly supported on the movable frame; and that the centering shaft is provided with a flange portion which comes to contact with an upper surface of the movable frame when a lower end portion of the centering shaft is secured to the frame not to be upwardly movable relative to the frame with itself passing through the lower mold.

11. The vulcanizer as set forth in any one of Claims 5 to 10, characterized in that the lower mold is composed of a segmented tread mold

including a plurality of mold segments which are guided to be radially movable in a horizontal plane and a lower sidewall mold for closing the lower side surface of the segmented tread mold and that the upper mold is composed of an upper sidewall mold for closing an upper side surface of the segmented tread mold.